CONTENTS

	Page No.
List of figures	1
List of tables	IV
List of graphs	VI
List of published papers	X
CHAPTER 1	
INTRODUCTION	
1.1 Importance of speech	1
1.2 Role of speech in human communication	1
1.3 Uses of speech in different walks of life	3
1.3.1 Linguistics	3
1.3.2 Sociolinguistics	4
1.3.3 Psychology and Psycholinguistics	5
1.3.4 Phonetics	6
1.3.5 Acoustics	7
1.3.6 Medical field	8
1.4 Biological foundation of language/speech	9
1.4.1 Speech production	9
1.4.2 Speech rhythmicity	12
1.5 References	14
CHAPTER 2	
BIOLOGICAL BASIS OF SPEECH PRODUCTION	N
AND ITS PARAMETERS	
2.1 Productive mechanism	20
2.1.1 Air-stream mechanism	20
2.2 The sensory basis of speech	22
2.2.1 Lungs	23
2.2.2 Breathing movements	24

			Page No.
2.3	The m	nechanisms of speaking	26
	2.3.1	The voice producing mechanism	27
	2.3.2	The articulatory mechanism	29
2.4	Acous	tical parameters of speech sound	30
	2:4.1	Formants	32
	2.4.2	Male/female sound differentiation	33
2.5	Refere	ences	36
		CHAPTER 3	
		ANATOMY OF BODY DURING PREGNANCY	
3.1	The th	norax	38
3.2	The a	bdomen	39
3.3	The a	bdominal cavity	40
3.4	The u	terus	41
	3.4.1	Reproductive changes in the uterus	41
	3.4.2	Supports of the uterus	42
3.5	The m	enstrual cycle	42
	3.5.1	Time of ovulation in relation to menstruation	43
	3.5.2	Importance of determining the time of ovulation	44
3.6	The pl	acenta	44
	3.6.1	Functions of Placenta	47
	3.6.2	Normal site of implantation of ovum	48
3.7	Amnio	tic fluid	48
	3.7.1	Function of amniotic fluid at the time of labour	49
3.8	Umbili	cal cord	49
3.9	Mutual	relationship of amniotic cavity and uterine cavity	50
3.10	The fo	etus	53
	3.10.1	Growth of foetus	53
	3.10.2	Physical representation of different stages of	
		foetus growth	54
	3.10.3	Determination of the age of an embryo	5 <i>7</i>

			Page No.
3.11	Physic	ological changes during pregnancy	58
	3.11.1	Uterus	58
	3.11.2	2 Weight-gain	59
	3.11.3	B Factors influencing the weight-gain	59
	3.11.4	Importance of weight checking	60
3.12	Refere	ences	61
		CHAPTER 4	
	Ν	IETWORK THEORY OF VOCAL TRANSMISSION AND	
	1	NTER-RELATIONSHIP WITH WOMB DEVELOPMENT	
4.1	Acous	tical parameters of a speech system	63
	4.1.1	Inertance	64
	4.1.2	Acoustical capacitance	65
	4.1.3	Representation of Electrical, mechanical and	
		acoustical elements	66
4.2	Acous	tical model of vocal tract	67
4.3	Devel	opment of two port electrical network of vocal tract	70
4.4	Electri	ical and mechanical model of womb	74
	4.1.1	Mathematical formulation of womb	76
4.5	Pregna	ant woman vocal tract Electrical network	77
	4.5.1	Inter-relationship of womb with vocal tract	79
4.6	Refere	ences	80
		CHAPTER 5	
		STATEMENT OF PROBLEM AND MEASUREMENT	
5.1	Staten	nent of Problem	82
5.2	Measu	rements	83
	5.2.1	Frequency measurement	83
	5.2.2	Amplitude measurement	84
	5.2.3	Time duration measurement	85
	5.2.4	Energy measurement	85
5.3	Refere	ences	86

.

CHAPTER 6 RESULTS

			Page No.
6.1	Peak	frequency measurement	89
	6.1.1	Assessment of menstrual cycle	89
	6.1.2	Determination of level of pregnancy	99
6.2	Forma	nt frequency measurement	112
	6.2.1	Assessment of menstrual cycle	112
	6.2.2	Changes in formant frequencies during pregnancy	129
	6.2.3	Assessment of foetus weight-gain and sex	145
	6.2.4	Assessment of foetus length gain	155
	6.2.5	Assessment of foetus width / thickness gain	156
6.3	Forma	nt amplitude measurement	162
	6.3.1	Formant amplitude behaviour in case of non-pregnant	
	•	woman	162
	6.3.2	Formant amplitude changes during pregnancy	171
	6.3.3	Depiction of movement of foetus in womb	187
6.4	Time (duration measurement	195
	6.4.1	In case non-pregnant woman	195
	6.4.2	Time duration characteristic with pregnancy	204
6.5	Energy	y measurement	216
	6.5.1	In case of non-pregnant woman	216
	6.5.2	In case of pregnant woman	218
6.6	Model	representation	221
	6.6.1	Development of model under pregnancy	221
	6.6.2	Discussion of the model	238

CHAPTER 7

CONCLUSION AND SCOPE FOR FURTHER WORK

	Page No
7.1 Conclusion	240
7.2 Scope for further work	241
BIBLIOGRAPHY	242
APPENDIX	248